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operates a balancing motor. The ordinary galvanometer must operate in an upright position and be stationary. The electronic potentiometers can operate in any position or when in motion. They were used in large numbers during the war on ships and planes where ordinary galvanometers would be useless.

Developments of the principles and applications of these instruments was hastened greatly by the war. All instrument companies were operating at top speed. In new plants constructed, the fraction of the total cost represented by instruments has increased tremendously. This was particularly true in the petroleum and synthetic rubber industries. This industry lends itself to automatic control better than many others and also is in a sufficiently good financial position to purchase large numbers of instruments.

In conclusion, the theory and applications of instrumentation have grown tremendously in the last few years and will continue to do so. The tendency in many industries is toward continuous processes which are particularly well adapted to control.

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EFFECT OF CERTAIN PHYSICAL AND CHEMICAL AGENTS ON THE TREATMENT OF MOUSE LEUKEMIA*

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ABSTRACT

Experimental leukemia may contribute valuable knowledge pertaining to human leukemia and related diseases. Furth, Flory, and their associates have shown mouse leukemia to be markedly similar to human leukemia. The blood picture of a high white count with numerous immature cells in the circulating blood, the development of a terminal anemia is similar to that found in man. Histological changes are practically identical to those found in the human disease and both show enlargement of spleen, liver and lymph nodes. Human leukemia runs a variable course with frequent spontaneous remissions in which the blood picture tends to become normal and clinical symptoms regress. These spontaneous remissions make the evaluation of a therapeutic agent unreliable. In the use of mouse leukemia for testing therapeutic agents, one avoids many difficulties encountered in evaluating a given treatment in the human disease. Untreated animals serve as controls and increase in sur-

vival time of treated animals beyond controls is used as an index of evaluation.

The leukemias treated in this study are transplanted leukemias from spontaneous cases which arose in a pure stock of F mice. Enlargement of the spleen in an animal inoculated with a given number of leukemic cells is used as an index of the presence of the disease. Transplanted leukemias give 100% takes if the transplant is made into the same pure line of mice or into F₁ hybrids.

Several agents, known to be of value in the treatment of human leukemia, have been studied on both myelogenous and lymphatic mouse leukemia. These agents produce similar effects on mouse leukemia. Leukemic mice given x-ray (3 to 5 doses of 80r to the whole body) show a drop in the leukocyte count from 100,000 to normal levels, reduction in size of spleen and nodes, a shift toward maturity of cells found in the blood and bone marrow. The response is temporary and the animals die of leukemia although they survive control mice. Benzol has long been known to be of value in certain cases of chronic myelogenous leukemia. Animals in the 9th transfer generation of a chronic myeloid leukemia were treated beginning on the 21st day after inoculation. Mice at this time showed a white count of around 20,000. Benzol tended to keep the counts low (50,000-70,000) for the first five weeks of treatment, spleens remained small, but the average survival time was not significantly increased. Stilbamidine, which gives a favorable response in multiple myeloma, was tried with negative results.

The most promising agent for the treatment of chronic myelogenous leukemia, at the present time, is ethyl urethane. Patterson and others in London (1946) noted that urethane reduced the white count and tried it on human leukemia. Their findings were comparable to x-ray therapy, but the effect was dependent on the continued use of the drug. Engstrom and Kirschbaum (1946) first tried it on mouse leukemia and obtained a significant response, but the animals lost considerable weight. In our studies of survival time, we attempted to lessen the dosage and determine the minimal dose required to produce remission and increase survival time. With one anesthetic dose of urethane per week, the survival time was increased from an average of 63 days for controls to 85 days for experimentals. If a total of one anesthetic dose per week was given in two or three injections, the survival time was similar to that of controls. Urethane was ineffective in treatment of an acute lymphatic leukemia. On a human patient in a terminal stage of disease and resistant to x-ray, recently treated at the University Hospital, urethane produced a definite remission in the disease symptoms and the patient's condition was markedly improved. This indicates the value of urethane as an adjunct to other therapeutic agents, and warrants further investigation.

SOME PHYSICAL PROBLEMS ASSOCIATED WITH
THE CLINICAL USE OF RADIOACTIVE IODINE

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SOME INVESTIGATIONS CONCERNING
PHOTORECEPTOR MECHANISMS

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SLAVES OF FORMULAS

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IN-SERVICE CLASSES FOR TEACHERS ON
CONSERVATION

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The events of recent years have focused the attention of lay groups as well as teachers upon the importance of conserving our natural and human resources. Previous to World War II we heard and read many vivid portrayals of what was happening to the natural resources of the United States, of how man-made droughts and floods were on the increase over our land. We discussed the loss of the eroded hills and vanished grasslands, shuddering at the destruction wrought by ignorance and greed.

Generally, every teacher and administrator agreed that conservation teaching should be included in the curriculum. A few states had given conservation complete endorsement and included it as a part of the state course of study at every grade level. In Minneapolis at the elementary level we learned that the modern school-trained child with his keenness of new thoughts and new ways was bringing the subject of conservation into the schools. With his wide observation and varied reading abilities it could not be otherwise. His eager questions and explorations proved that he could not know his own community without meeting conservation problems.